

# CSP Systems - Analysis and Commercial Support

SETO 2020 Peer Review

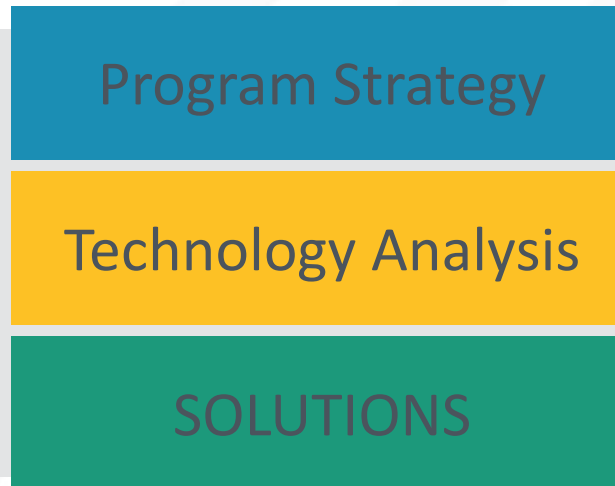
April 6-8, 2020

# CSP Systems – Analysis and Commercial Support



## CSP Program Benefits:

Strategy and Planning  
Outreach and Communication  
Strengthen Analysis Capability  
Impact with Near-Term Results



## Industry Benefits:

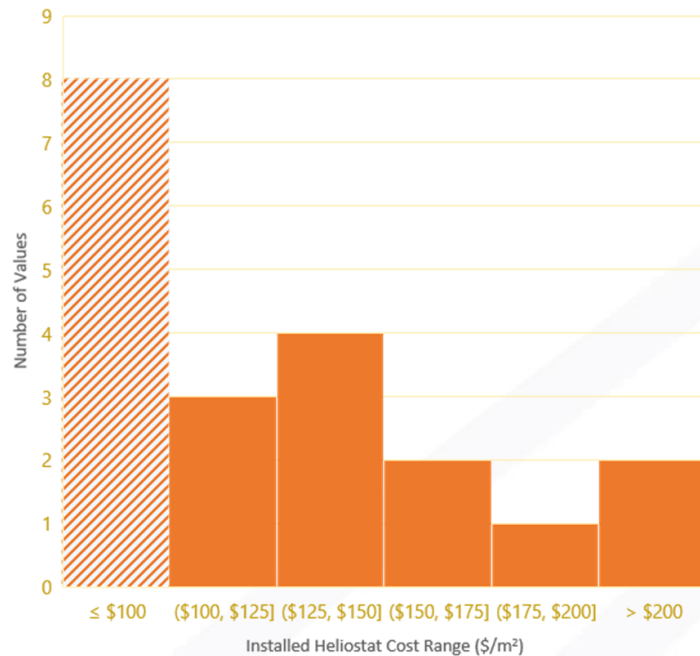
Benchmark Performance  
Best Practices Information  
Design and Operation Tools  
Solutions for Industry



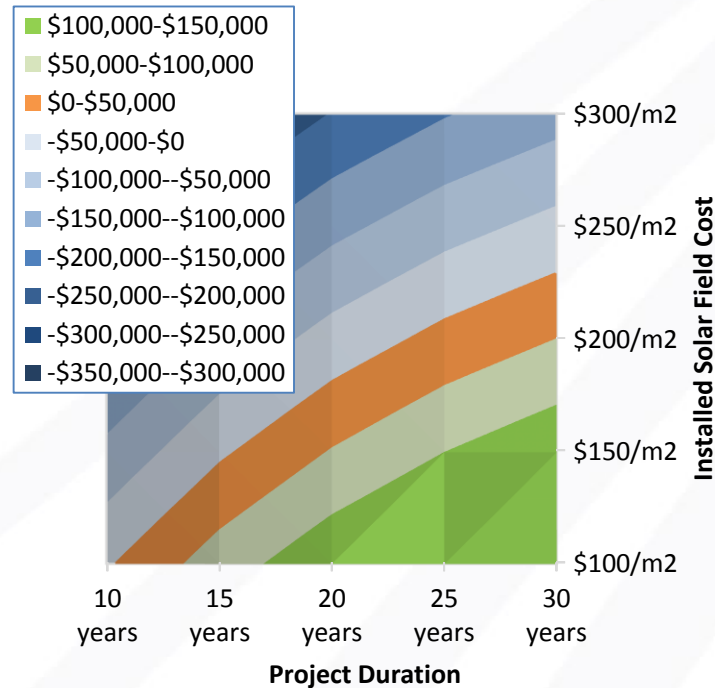
# Strategy

## NREL Analysis

### Viable solution space for Solar Process Heat



### Solar Field Costs Global Survey



## PROGRAM ROLE

Validate and track cost trends

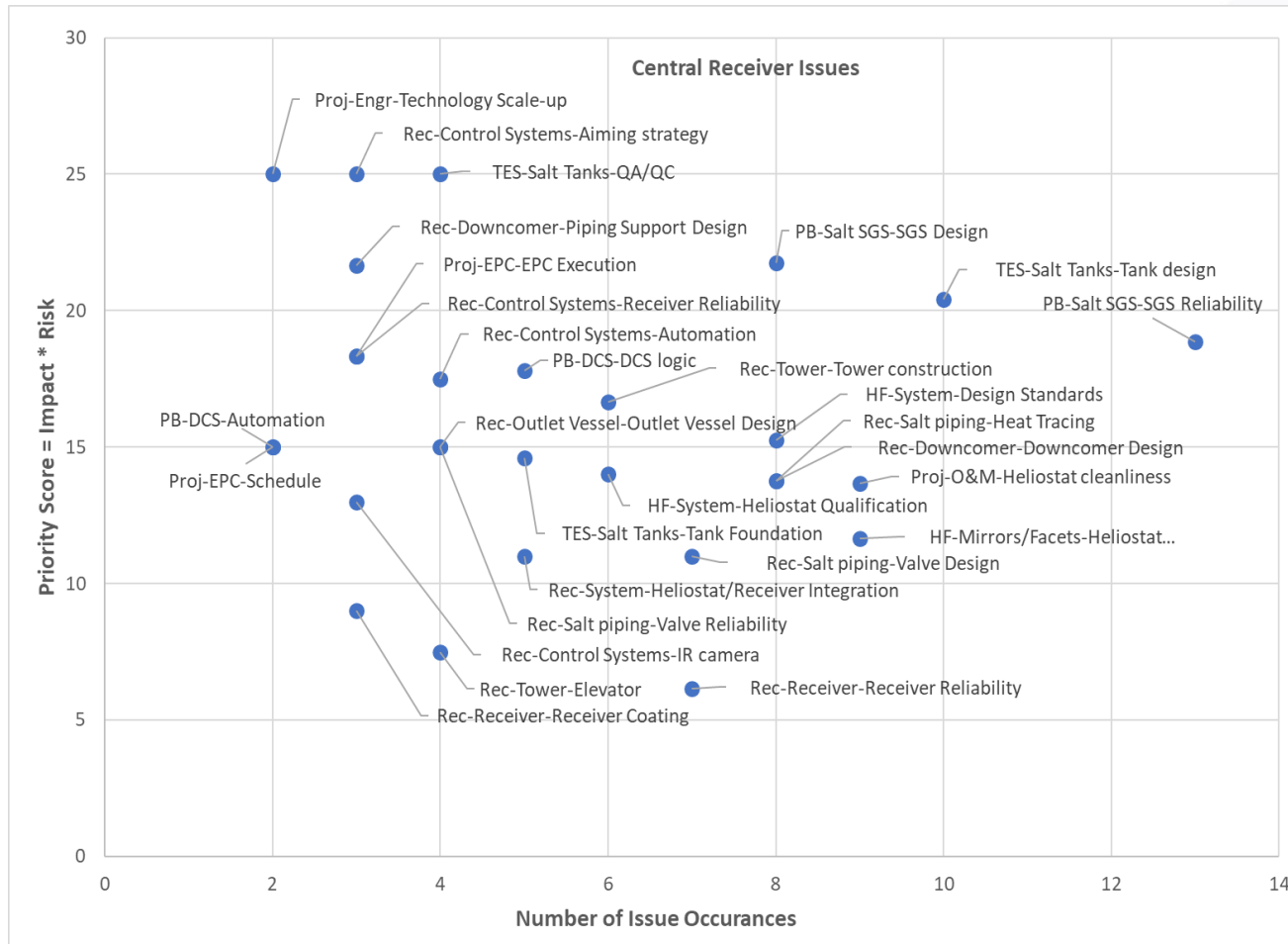
Identify cost drivers / sensitivity

## INDUSTRY ROLE

Provide critical data

# Strategy

## Best Practices Study



## PROGRAM ROLE

Industry Surveys

Analysis

Identify Research Needs

## INDUSTRY ROLE

Data

Shared Lessons

Benchmarking

# Analysis

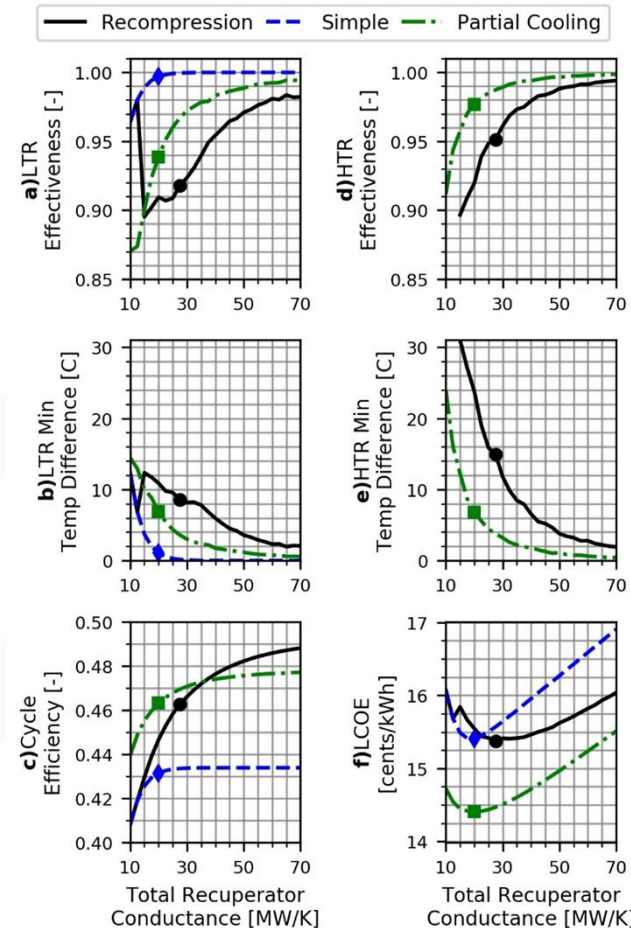
## NREL Modeling

### sCO<sub>2</sub> Cycle Integration

- Multiple Cycle Configurations
- Off-design Operation
- Comparison to Steam Rankine

### Cycle Maturity Needed

- Compressor Development
- Operating Strategy
- Controls



## PROGRAM ROLE

Evaluate New Technology  
Impacts in CSP Systems

Identify Research Needs

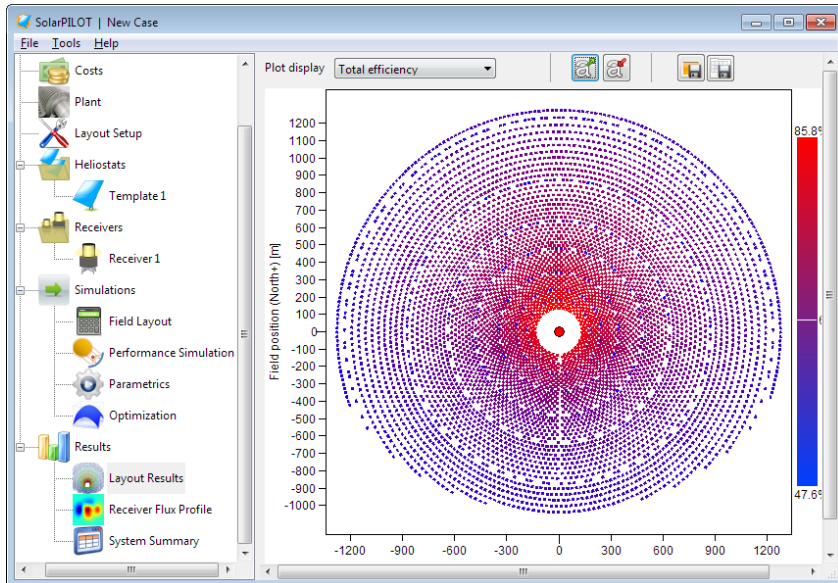
## INDUSTRY ROLE

Turbine Component Data

# Analysis

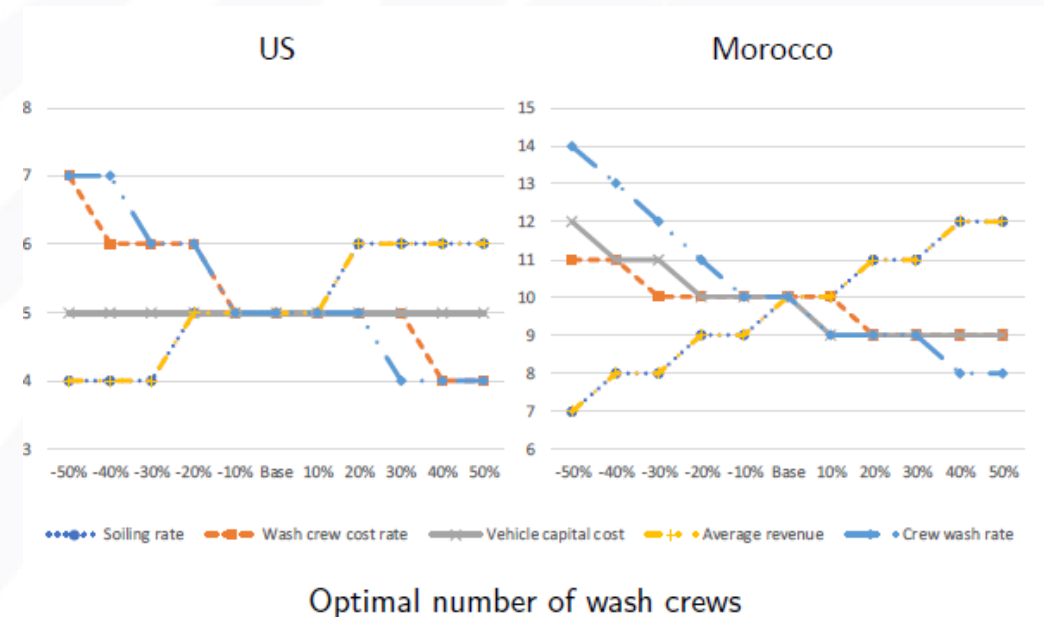
## NREL Modeling

-System Advisor Model (SAM)  
Continuous enhancements



NREL developed Solar Pilot enables the optimization of the integrated solar field and receiver design and integrates with SAM

Dispatch and Forecasting Optimization

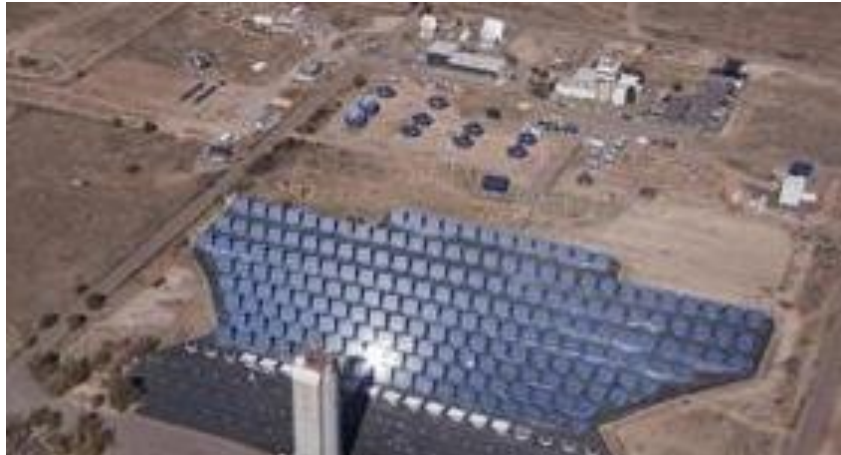


New Modeling Tools Improve Plant Design Competitiveness, Increase Revenue and Reduce Operating Cost



# Solutions

## NSTTF



### HELIOSTAT FIELD

212 heliostats can produce 6 MW and a peak flux of  $300 \text{ W/cm}^2$

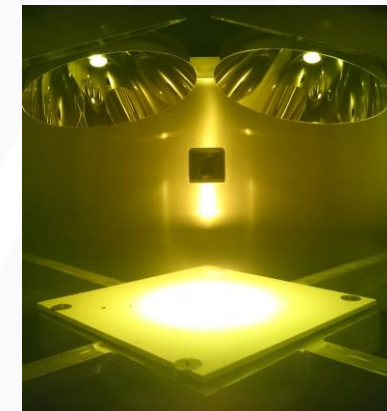
### SOLAR TOWER:

- 200 ft. • 4 - 350 sq. ft. test bays • 1 - 750 sq. ft. test bay

### MOLTEN SALT TEST LOOP (MSTL)

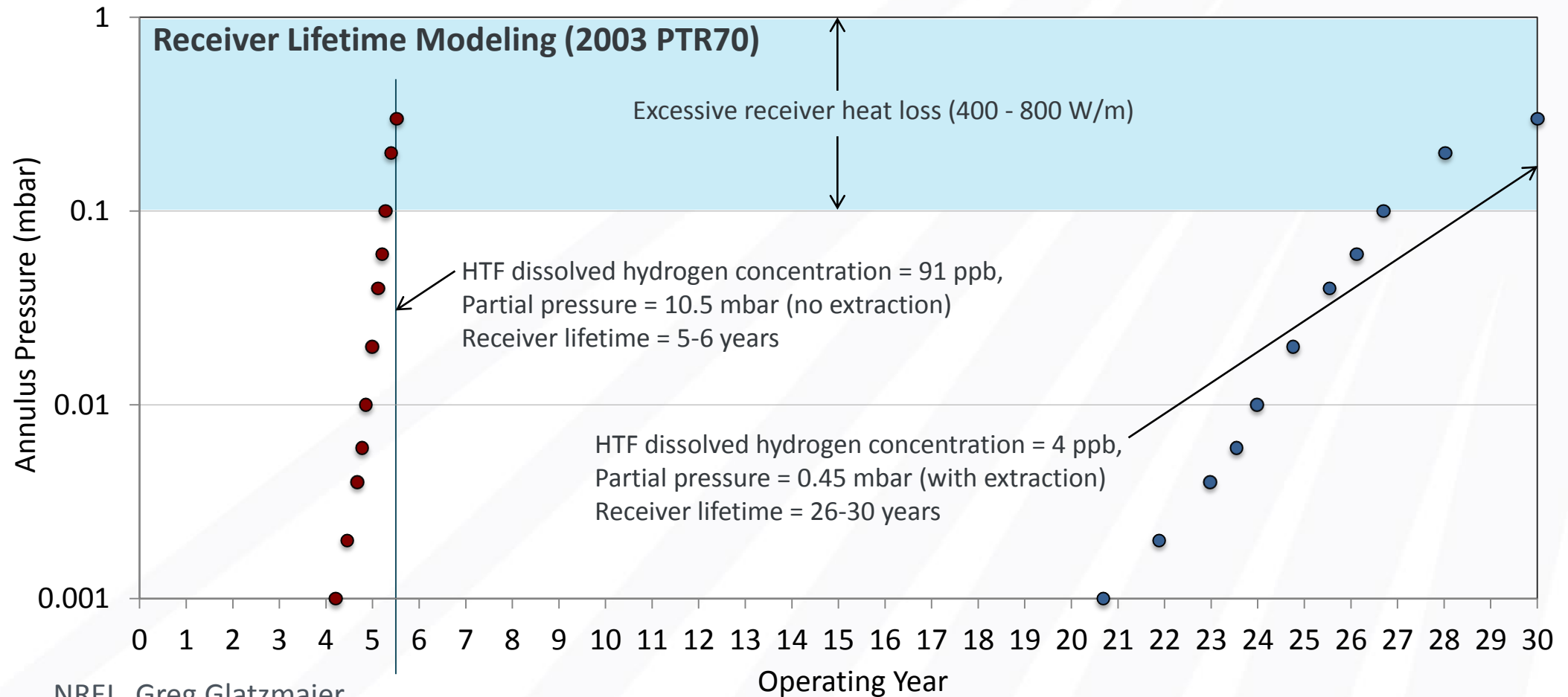
### HIGH-FLUX SOLAR SIMULATOR WITH AUTOMATED SAMPLE HANDLING & EXPOSURE SYSTEM (ASHES)

### SOLAR FURNACE



# Solutions

## Hydrogen Mitigation



NREL, Greg Glatzmaier



# Challenges

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Lack of U.S. Market for CSP – Requires proactive Industry Connection

Quantifying Value of CSP in U.S. market

# QUESTIONS?

